MERCHANDISING MILK THROUGH VENDING MACHINES

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Foreword and Acknowledgements

This report is based, in part, on a Northeast regional study entitled, "Merchandising Milk and Other Dairy Products." It was financed, partially, by regional funds.

The results obtained in this regional study have been supplemented by information summarized from many other publications on milk vending. To make the report more readable, reference to the various studies has been made only by numerical identification of the sources shown in the bibliography.

The authors also have made use of their own observations of milk vending and, at times, have drawn conclusions from these observations as well as from the analyses of other research workers.

In the phase of the study on which this report is based, the following persons were members of the Sub-Committee on Milk Vending or assisted the Committee:

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Contents

Summary and Conclusions

MERCHANDISING milk through vending machines can be profitable for milk distributors and specialized operators. It also provides an additional outlet for milk in the higher priced uses. Milk vending represents a segment of automatic merchandising which is growing rapidly, but not phenomenally. It is one of the newcomers to vending, with a definite upturn in importance since 1950. Although it is viewed with suspicion by some industrial site owners, there is a noticeable improvement in the general attitude of management toward vending. School officials in many areas continue to view it with misgivings, but the consumer tends to give it his approval. At the present time milk vending accounts for only a very small part of total milk distribution.

There are two general types of milk vending machines. Indoor machines provide milk and other dairy drinks for on-the-spot consumption. Outdoor machines normally provide milk in quart or half-gallon containers for home use. Some machines, however, vend both half-pint, third-quart, or pint containers for on-the-spot consumption as well as the larger containers for home use.

The operators of milk vending machines are of two types. One is the milk distributor who normally makes wholesale or home deliveries, and the other the specialized operator whose chief activity is operating vending machines. The former tends to have a smaller scale operation and to have fewer and more scattered locations for machines, whereas the specialized operator tends to have more milk machines, as well as other kinds of vending machines, concentrated in industrial locations.

The ownership and servicing of milk vending machines follows no set pattern in all areas. Local conditions determine the arrangements made. Generally a milk distributor is independent of the specialized operator, whereas the latter depends on the distributor to supply and often service his milk vending machines.

Several kinds of beverages may be vended in such machines, and a varied selection results in larger total sales per machine. Milk and chocolate milk are by far the most important milk beverages sold in vending machines. However, other fluid milk products should not be overlooked in maximizing returns from milk vending.

The profitability of milk vending for either type of operator depends on a number of factors. Those under the control of the operator are: (1) the selection of a desirable location, (2) quality of product, (3) cleanli-

ness and attractiveness of the machine, (4) dependable operation of machines, (5) size of the servings vended, (6) price of the product vended, and (7) accessibility of the machine.

Cold, fresh milk appears to be a "must" with customers. Cleanliness and attractiveness are other factors which determine whether people continue to use a vending machine. A machine which is not operating satisfactorily injuries sales severely. Customer preferences for half-pints, third-quarts, pints, quarts, or multiple-quart containers must be determined by each vending operator. Deviation from the usual or customary market price will affect potential users. Where possible, machines should be so located that they can be easily seen, and readily accessible in order to encourage impulse sales based on increased availability.

Important factors not under the control of the operator also have an influence on sales volume. Some of these are: (1) type of activity of potential customers, (2) their income, (3) competition from other products, (4) time available to consumer, (5) age and sex of users, and (6) attitude of management.

Consumers engaged in heavy physical activity tend to consume more milk and are more receptive to pints and third-quarts, while office workers tend to prefer half-pint units. Industrial locations are of value only if workers have the time and opportunity to visit the machines. People in the younger age brackets tend to purchase more vended milk than do older persons. High-paid workers tend to purchase more vended milk than do low-paid workers, other factors being equal.

Those indoor locations which appear to offer the best sales potentials are: industrial plants, schools, and office buildings. The most favorable outdoor locations are: gas stations, centers of residential areas, and recreational areas.

Costs as well as sales volumes are determinants of success. Commissions paid for location, salaries paid to delivery men and solicitors, and transportation costs, particularly driving time, are among the more important elements of cost in operating milk vending machines. Much of the difference in break-even points from one vending operation to another is due to variations in these items of cost. Other expense items appear to be of secondary importance. An adequate number of machines and adequate sales volume per deliveryman are necessary to minimize unit delivery expenses. Unit transportation costs can be minimized by grouping machines in a relatively small area.

Location commissions of 10 percent of gross sales appear to be most common, although often they are on a sliding scale basis with the size of commission related to the volume of sales.

Milk vending machines now available are able to meet practically any requirement in the vending of milk. Prices in 1957 ranged from $360 for a semi-automatic indoor unit to $3,400 for one of the larger outdoor units.

Regulations covering the use of milk vending machines vary with local conditions including sanitation and various tax and license provisions. Observance of such local and state regulations is essential and should be determined prior to embarking on a milk vending enterprise.

The attitude of union labor toward vending machines differs, depending on labors' association with milk vending. As consumers, the members of labor unions appear to be very favorable toward milk vending. On the other hand, attitudes of labor unions concerned with milk distribution are not always favorable to milk vending, particularly if route customers (and routemen's commissions) are lost as a result of vending. The latter does not appear to be a great deterrent to vending at the present time.

Information now available indicates the net sales through vending machines do not amount to more than 1.5 percent of the total milk sales in a community. Even this amount could be of sufficient importance to milk producers and to operators of vending machines to justify the use of these machines. To milk producers, this would mean greater sales in the higher-priced uses.

Probably vending will not replace other methods of selling milk, although it may cause some changes in the distribution channels used. Evidence indicates that the number of machines in use is increasing every year. Where conditions are advantageous, there probably will be many more installations, especially in industrial locations; but a person considering the installation of such machines should study each location, prior to its use, to make certain that the location's features and characteristics are those associated with profitable operation.

Merchandising Milk Through Vending Machines

JAMES H. CLARKE and WALTER F. THOMPSON

Introduction

OBJECTIVES

THIS study purports to bring together, in a condensed and consolidated presentation, the important features of machine milk vending as reported in the more recently published studies and articles on the subject. During recent years milk vending has been a topic of much discussion among milk distributors, milk producers, vending operators, school officials, business executives, government officials, and consumers generally. Milk vending has been suggested as a means by which dairy-product surpluses might be reduced.

The study here presented also includes research findings of the Agricultural Experiment Stations of a number of states in the Northeast which have been cooperating in a broader study of merchandising dairy products.

This review of published studies pertaining to milk vending has been helpful in orienting the work undertaken by the research personnel in the Northeast. It should be helpful both to those interested in commercial milk vending and to consumers.

In addition, it should help milk producers, farmer organizations, business and school officials, labor leaders, and others who find it necessary to make decisions which involve milk vending.

TYPES OF MACHINES INCLUDED

This study is concerned with three general types of coin-operated milk vending machines. (1) The indoor, package, (2) the outdoor, package, and (3) the indoor, bulk (cup). Bulk dispensers, manually operated by restaurant or similar food service employees without the use of coins, are not covered in the present study.

Most of the data published refer to studies and observations made with reference to the coin-operated indoor and outdoor package-vending machines. Almost no data are available with reference to bulk (cup) milk vending because this method of vending has been used to a very limited extent.

METHODS OF STUDY

This report is based primarily on work conducted in the Northeast Region and on published reports, studies, and articles dealing with milk vending. These reports have been reviewed, and the pertinent findings from them are incorporated herein. The bibliography at the end of this report gives a detailed listing of the major source materials used.

Limitations exist in the data used in the various studies which form the basis of this publication. For example, some evaluations of sales through vending machines are based on such a short period of use that the novelty factor and seasonal variability in sales cannot be taken into account. In some cases the validity of conclusions regarding experiences with milk vending must be questioned because survey responses may not be statistically representative samples of the universes involved. The results of case studies must be accepted as indicative of conditions, but not necessarily representative of all vending.

Another limiting factor is the possibility that a disproportionate number of replies to one industry-wide survey came from those operators who had successful experiences with vending. No adjustment was made for this possibility.

Where it is feasible, the limitations of data are indicated in the report. However, a sincere effort has been made to eliminate unreliable results from those which either are stated, or are the basis for statements, in the present report.

Development of Milk Vending

Milk vending is a segment of automatic merchandising which apparently is growing rapidly, although industry-wide statistics on indoor milk vending are available only for the last few years.

Between 1955 and 1958 the number of indoor vending machines in operation in the United States rose from 21,000 to 41,750, or almost doubled in number (27). For the same period, the estimated units sold through these machines increased from 273 million to 459 million units, or 68 percent. If it is assumed that the units vended averaged 0.6 pounds of milk, 275 million pounds of milk were sold through indoor vending machines in 1958. Despite the rapid growth of milk vending, this volume accounts for only one-half of one percent of the estimated non-farm fluid consumption of milk for 1958. The inclusion of the volume of units vended outdoors for which nation-wide statistics are not available, would add considerably to this volume.[1] Nevertheless it is evident that milk vending is not a major means of distributing milk.

[1]A 1954 study based on 95 percent of the milk vending machines in Missouri indicated that outdoor machines sold 21 percent of the total volume sold through vending machines despite the fact that outdoor machines accounted for only 1.5 percent of all machines.

According to G. R. Schreiber (27), Editor of *Vend,* the number of vending machines in operation in 1954 and 1958 were as follows:

	1954 NUMBER	1958 NUMBER	PERCENT INCREASE OVER 1954
Bottled soft drinks	580,000	764,500	31.8
Cold cup drinks	50,700	105,300	107.7
Hot coffee	37,200	113,900	206.2
Milk	16,000*	41,750	160.9

*Source: "Automatic Merchandising," BSB-151, May, 1956, United States Department of Commerce.

The table indicates that the percentage increase for the installation of milk vending machines was larger than for bottled soft drinks and cold cup drinks although actual numbers of machines were lower than for those in other categories. Drinks sold weekly per machine in 1958 were: hot coffee, 315; milk, 220; bottled soft drinks, 140; and cold cup drinks, 350.

In New York State a study of vending conducted by Cornell University, published in 1956, reported that candy and soft drink machines accounted for the highest proportion of all vending machines in use in all plants. Milk vending machines ranked fifth in importance in this respect for upstate cities and eighth in New York City. Coffee vending machines showed a stronger position relative to other types of vending machines in New York City than in the upstate cities. In terms of numbers, milk vending machines are considerably more important in the upstate areas than in New York City.

Milk vending also is much less important in the total beverage industry than is the vending of several other beverages. The reasons for this should be considered when appraising the strength of the trend toward more milk vending. Some of the reasons why milk is less important, especially as related to carbonated drinks, are:

1. Cost of producing and handling milk is much higher than for soft drinks.

2. Risk with milk is greater than with most other items sold through vending machines.

3. An expensive unit is necessary to provide stable and adequate refrigeration as well as to meet high sanitation standards.

4. Most other products sold through vending machines do not require the frequent service calls necessary when milk is vended.

5. When turnover is low at a location, milk not sold within two days is considered old milk and must be replaced at a loss.

Most of the present operators of milk vending machines entered that business since 1950. According to a study (19) of New York State vending published in 1956, more than two-thirds of the milk vending machines in the industrial plants had been installed during the preceding five years. This should be considered when comparing the growth of milk vending, especially with reference to machines which vend bottled soft drinks.

The following regional distribution of the location of vending machines used by milk distributors and specialized operators in August 1955, indicated, by geographic area and type of control, the relative numerical importance of such units. These units are concentrated in areas of greatest industrial activity, and specialized operators use nearly twice as many vending machines as do milk distributors.

TABLE 1. REGIONAL LOCATION AND KIND OF VENDING MACHINES USED BY 86 MILK DISTRIBUTORS AND 96 SPECIALIZED OPERATORS, AUGUST 1955

Region	Milk Distributors*			Specialized Operators**		
	No. Operators	No. of Machines		No. of Operators	No. of Machines	
		Automatic	Semi-Automatic		Automatic	Semi-Automatic
New England	6	134	72	9	174	147
Middle Atlantic	32	857	668	18	951	41
East North Central	17	477	220	32	1996	1300
West North Central	8	80	323	6	168	248
South Atlantic	11	171	48	13	382	99
West South Central	7	75	83	10	247	131
Mountain	3	47	4	2	66	92
Pacific	2	35	0	6	111	39
U. S. Total	86	1876	1418	96	4095	2097

*Principal activity is conventional distribution of milk.

**Principal activity is automatic merchandising.

Source: Spurlock, Hughes H. and Donald E. Hirsch, *Vending Milk in Small Containers by Cooperatives and Others*, FCS Circular 20, Farmer Cooperative Service, United States Department of Agriculture, Washington 25, D. C., p. 23, Appendix Table 2.

Accompanying the increase in number of machines, there also was until 1957 an increase in the volume of milk vended. In the United States the weekly average per machine increased from 250 units (mostly half-pints) in 1955 to 300 in 1956. However, in 1957 and 1958 this average declined to 275 and 220 units weekly, respectively.

Successful vending has been associated with items which are characterized by: (1) low unit cost, (2) universal use, (3) an appeal to impulse buying and (4) almost immediate consumption. Milk seems to meet all of these requirements. Perhaps these are some of the reasons for the increase in the volume of milk vended.

Milk Vending Equipment

Machines now are available to meet practically any requirement in vending milk. Those considering the purchase of milk vending machines can benefit by giving careful attention to all of the machines available in order to select the machines best suited to their needs.

INDOOR MACHINES

Indoor machines are both automatic and manually-operated (semi-automatic).[2] Until recently they were adapted only to the sale of packaged milk. Available also today are automatic machines which deposit a paper cup and then fill it with milk. Unfortunately, there is practically no material available concerning the use of such equipment over an adequate period of time. Therefore this report will not include a detailed consideration of these bulk (cup) machines.

Manually-operated machines are less costly than automatic machines and require fewer sales to be profitable. For this reason manually-operated machines can be used profitably where volume is too low to justify the use of the more expensive, fully automatic machines.

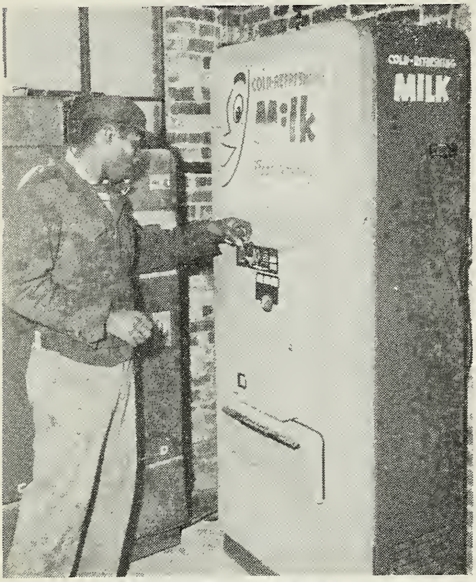
Automatic indoor units can vend products more rapidly than manually-operated machines and thus are preferred where customers demand a large volume within a short time. Tests of the two types, run in elementary schools in West Virginia (6), indicated that the manually-operated machines vended less than half as much milk as did automatic machines during the usual 15-minute recess periods if both types were used at full capacity. Some schools, it was found, assigned older students to sell milk from the manually-operated machines, instead of using the machines as venders. In these cases, refrigerators would have served the same purpose by storing and cooling the milk.

OUTDOOR MACHINES

The outdoor machines available are automatic units of two major kinds. The smaller type resembles the automatic indoor model, with a shelter built around three sides, whereas the larger outdoor venders resemble a walk-in type of refrigerator. There are many modifications of these basic styles. As an example, there is an egg-and-milk unit made in Arizona, which is designed for use at ranches, cities, roadside stands, and similar locations. Poultrymen operating such venders usually buy milk at wholesale to retail through the vending machines along with their eggs. These machines have a vending capacity of 100 half-gallons of milk and 40 dozen eggs, plus refrigerated storage space.

[2]In 1954, out of 790 indoor machines covered by the Missouri study (1), 449 (57 percent) were automatic.

TYPES OF INDOOR VENDING MACHINES



AUTOMATIC (PACKAGE)

BULK TYPE (CUP)

MANUALLY-OPERATED, SEMI-AUTOMATIC (PACKAGE)

TYPES OF OUTDOOR VENDING MACHINES

QUART & HALF-GALLON MACHINE

HALF-PINT MACHINE

QUART MACHINE

PRICE, SIZE, AND CAPACITY

Prices of vending machines range from $360 to $3,400, with extra charges for such items as coin changers, cold-weather heaters for outside units, transportation, signs, and decorations. These differences in price also are related to capacity, number of selections, coin mechanisms, and the extent to which they are automatic. In New Jersey, a survey (5) covering 782 outdoor vending machines disclosed an average original cost per machine of $1,007.

A medium-priced, manually-operated vending machine sells for approximately $450 and has a vending capacity of 78 units (half-pints or third-quarts) plus space for precooling an additional 72 units. This machine is about 39½ inches high, 41-45 inches long, and 32½ inches wide.

A typical indoor automatic vender sells for approximately $660 and has a vending capacity of 210 units (half-pints or third-quarts). The dimensions of this unit are 18 inches deep, 32½ inches wide, and 77¾ inches high.

A bulk (cup) vending machine with a choice of two or three flavors and equipped with a coin changer sells for approximately $1,000.

Outdoor machines are of many sizes. Indoor machines may be adapted to outside use for costs ranging from $50 to $145. Other outdoor units are large, all metal, with thermostatically controlled heating and cooling units to keep the milk in a range of 32 to 37° F. In addition to the refrigeration unit there is an ejection system which is put into movement by the coin mechanism. A carton is ejected following the insertion of a customer's coin. A typical machine is made in two sizes; one holds 500 half-gallons, including 102 on the vending mechanism, and the other size holds 1,000 half-gallons. Prices range from $2,500 to $3,400. Dimensions are 8 feet by 8 feet by 19 feet high.

Capacities of vending machines vary greatly. Manually-operated indoor units are available with capacities of from 50 to 136 units, with storage capacities of from 80 to 140 units. Automatic indoor machines have capacities from 140 to 216 units, with storage capacities of from 36 to 198 units. A typical large outdoor unit has a capacity of 400 half gallons, or 500 quarts, with storage space for as many as 225 half-gallons. An automatic, indoor bulk (cup) vending machine now on the market has a vending capacity for two 5-gallon cans (equals 180 nine-ounce cups) and storage space for two more 5-gallon cans.

Milk usually is vended in paper cartons. An estimated 92 percent of the vending machines use paper cartons, and most of the remainder use

glass bottles.[3] Paper containers are preferred for the following reasons:

1. No container recovery problem.

2. No container breakage to cause unsightly and dangerous litter which must be cleaned up.

3. Low operating costs compared with glass bottles.

The half-pint container apparently is the best seller. According to *Vend's* estimate (27) of indoor milk vending for 1957, 71 percent of the operators vend half-pints; 25 percent third-quarts; and 21 percent vend pints.[4]

In 1956 a Cornell University study (19) showed that in New York State the half-pint package was used in 61 percent of the milk vending machines. One-third of the machines vended one-third-quart units.

COIN MECHANISMS

Many machines have mechanisms which can be adjusted to sell products at any desired price. Such coin mechanisms should be constructed to minimize vandalism. Each coin mechanism should be equipped with a slug rejector which can be adjusted easily to proper operating conditions. Coin changing mechanisms are available for most machines for the payment of $50 to $75 additional.

The coin collection box should be accessible only to the operator and should be located to minimize opportunities for vandalism. Some manufacturers locate the coin box so that, if the box is vandalized, extensive repairs would not be necessary. They believe that the loss of vending receipts for a week or two would not be as great as the expense of major repairs to the machine.

SELECTION OF DRINKS

The number of items which may be selected from a machine varies. Typical indoor automatic machines provide for a selection of three or four different kinds of drink. The manually-operated machine can vend as many as seven flavors of packaged drinks, whereas the large, outdoor unit normally is limited to one or two kinds of beverage. Bulk (cup) machines available are limited to three flavors.

CONTAINERS

Vending machines should be selected to meet the customer demand at the location where the machine is to be used. Machines have limi-

[3]In the Missouri study (1) in 1954, 89 percent of the units sold per month were in paper containers and the remaining 11 percent in glass. Glass containers were used chiefly in school locations.

[4]These percentages total more than 100 because some machines vend more than one size container.

tations as to the kinds of containers which they can handle. Some require special adapters for certain containers. There appears to be considerable flexibility in adjusting a machine to take half-pint, third-quart, pint, or, in some cases, even larger units.

Some machines can be adjusted to vend different sizes of containers at the same time, but not more than one size from any one vending outlet.

PROPER SELECTION OF EQUIPMENT

A vending operator should make certain that any machine is constructed simply; that it maintains a uniform temperature ranging from 33 to 36° F. during all seasons; that it meets local sanitation codes and can be cleaned easily; that its storage capacity is large enough to minimize delivery expense and insure against shortages of milk due to erratic high sales volumes; and that it has good eye appeal, is free from mechanical failures, and requires a minimum of maintenance and adjustment. The machine should be dust proof, rodent proof, and insect proof.

Organization of Milk Vending

TYPES OF DISTRIBUTORS

There appear to be two principal kinds of organizations which engage in vending milk. One is the milk distributor whose primary activity is the conventional distribution of milk. For him vending milk is an enterprise complementary to his route operation. The major purpose of his vending is to make milk more readily available to consumers in locations where routes do not provide an adequate sales outlet. Such distributors enter milk vending because of the added volume per route, because of vending's promotional value in creating a demand for milk, or because of competition. The other principal organization which vends milk is the specialized operator whose primary activity is merchandising products with vending machines and who sells milk and non-dairy products through vending machines. Of approximately 5,600 specialized operators in the United States, one-fifth have one or more milk vending machines.

A New York study published in 1956 (19) indicated that milk distributors operated vending machines in a high proportion of industrial plants in upstate areas, but owned only about the same number of machines as specialized vending operators. In New York City, specialized vending operators accounted for both a greater proportion of locations and number of machines in plants than did dairies.

In 1954, it was found (1) that in Missouri 37 dairy distributors were operating 313 machines vending drink-size milk packages, while only

seven specialized vending operators had 489 machines vending similar packages. Many of the specialized vending operators arranged to have milk distributors stock vending machines with milk for them and to remove unsold products. However, the specialized operators' route salesmen were responsible for collections of receipts and on-location merchandising. Some specialized operators obtained their milk "at platform" from milk distributors (7).

Milk distributors should own milk vending machines at schools except in special cases according to a Wisconsin study (10). When schools obtain milk on the basis of contracts awarded to lowest bidders, it would be better for the school, or a school organization, to own the milk vending machine. This would make it unnecessary to change machines when the milk supply source was changed from one firm to another.

ADVANTAGES FOR MILK DISTRIBUTOR

The advantages of vending for a milk distributor are as follows:

1. The distributor retains more control over the quality and handling of products sold under his own brand or label by the selection of locations, products, prices, and the employees to service his vending machines.

2. Any net-profit margins in vending go to the distributor rather than to another party.

3. A resultant increase in volume of sales, whether sold by the distributor or to specialized operators, may lead to lower processing costs in the distributor's plant. A volume increase may lead to lower delivery costs on routes if the relatively unsuccessful locations are eliminated.

4. When an adequate volume of business is developed at a sales location, it is controlled by the distributor.

5. Payments for milk vended are cash, and there is no credit problem.

6. Vending offers opportunities for effective advertising. The distributor may be able to capitalize on this opportunity best if he owns and operates the vending machines.

ADVANTAGES FOR SPECIALIZED OPERATOR

Advantages for vending milk which often accrue to the specialized vending operator include the following:

1. A profit can be made on a narrow margin if service costs at each stop can be shared with other products in other vending machines at the same stop.

2. Valuable locations already may be available to specialized operators because the managements of many plants desire to have a single firm service all the vending equipment on their property.

A specialized operator usually has had previous experience in vending machine merchandising and has both the necessary facilities and a trained group of workers who are fitted to meet the problems of purchasing, placing, supplying, repairing, and protecting the machines.

MAINTENANCE RESPONSIBILITY

No matter who owns or delivers the milk to the machines in a large operation, one man or one department should be given the responsibility for the care of machines. The machines should be kept clean and in good working order. Unless the size of an operation is small and there are few machines, drivers should not be expected to care for them. Many men experienced in milk distribution believe that it takes a departmental set-up to make a successful vending operation. On the other hand, if the man who delivers milk to the machine can make minor repairs, it will help to keep the customers of the vending machines better satisfied since a more continuous supply will be available.

Practices concerned with maintaining machines and collecting receipts vary little among milk distributors and specialized operators. The latter, however, often combine service of milk machines with service of other types of vending machines.

Location of Equipment

INDOOR

Industrial plants are the most widely used indoor locations for both automatic and manually-operated milk vending machines. Many dairies or vending operators work through the factory unions when wishing to install machines. Frequently the operators offer the union a commission on gross receipts. The dairy or vending operator, supported by the union in obtaining the location, does not have to fear rival companies and is sure of regular patronage.

In the Cornell study (19) of New York installations it was found that factories were the most important kind of location. Milk vending machines were found in more than half of the plants visited in upstate New York cities, but were found in only 6 percent of the New York City plants. A Connecticut study (4) reported that a total of 181 indoor machines were located as follows: 133 in factories, 12 in schools, and 36 in various other locations.

Office buildings do not appear to be as popular as industrial plants for the installation of milk vending machines. In New York State it was found (19) that few office buildings had milk machines.

Schools are widely used as locations for vending machines, although in many areas school officials and teachers are not in favor of their in-

MILK, candy, hot drinks, and cold drinks were available to customers in machines grouped at convenient points throughout this plant.

stallation. This opposition to vending machines is based, in part, on the belief that the milk needs of students already are being met adequately through the school lunch and special milk programs. In some cases, the opposition is due to the added work thrown on school teachers and administrators as a result of food service in schools. More administrative work is required. Supervision and assistance of children during the milk break or recess periods is needed and added janitorial work is usually involved. In some schools, the period between classes is so short that few students have time to go to a machine, buy milk, and consume it without interrupting the school routine. In most grades and high schools, students are not permitted to frequent the hallways or other areas where vending machines would normally be located, except during recess periods, lunch breaks, or when supervised. In those areas where vending machines are permitted, it has been observed that they may be most practical in high schools, where the children have the manual dexterity necessary to operate the machines, handle the packages without spilling, and dispose of the cartons or bottles properly. Although children above the first two or three grades in elementary school probably have the necessary dexterity, the general practice in the lower grades is not to change classrooms, and therefore the actual time the pupils are in hallways where they could patronize a vending machine is usually limited to short recess periods and to the lunch period (10).

Other indoor locations used include theaters, hotels, drug stores, apartment buildings, college and university residential, classroom, office, and recreational buildings, military establishments, and municipal buildings.

OUTDOOR

The vicinity of automobile service stations has proven to be one of the most popular outdoor locations for vending machines (5), especially when such stations are located on heavily-traveled roads. Frequently station attendants stock the machines, when necessary, and a rental is paid to the businesses where the machines are located. Some of the very large units have been located in accessible yards of milk processing plants.

Other outdoor locations used are vacant lots and parking lots, parks, recreational areas, and camps such as those operated by the YMCA and the Boy Scouts of America. Some vending units are moved from school locations to such camp sites during the summer months, when schools are closed.

Volume of Sales

FACTORS AFFECTING SALES OF MILK THROUGH INDOOR MACHINES

Age

Although vended milk may appeal to all classes and ages of people, there is evidence that a location frequented by a group of young people has a higher sales potential than one frequented by an older group. Surveys reported by the University of Vermont (29) show that school children and young adults consume more milk per capita than any other age group.

Sex and Race

In a survey[5] of college students, conducted at the University of New Hampshire during the 1955-56 school year, it was found that young men purchased an average of .25 half-pints of milk daily, whereas young women purchased an average of .42 half-pints daily.

Among adults, men tend to be larger users of milk than women.

The Farmer Cooperative Service reports (28) that white people drink more milk per capita than non-whites. Similarly, individuals of Northern and Western European extraction consume larger quantities of milk than those who are descendants of people from Southern Europe.

Physical Activity

The type of physical activity in which people are engaged has a definite bearing on their milk consumption. People doing manual labor,

[5]Unpublished data furnished authors by Professor Herbert C. Moore, University of New Hampshire.

including heavy, strenuous work in industrial plants, consume more milk than those doing non-manual labor. Consumption of milk is high among employees working in hot places (28).

Purchasing Power

Little definite information is available concerning the relationship between purchasing power and the sale of milk through vendng machines. A recent report (20) from the University of Maine indicates that income is an important determinant of sales through milk vending machines. The Farmer Cooperative Service reports (28) that purchasing power and strenuous physical activities have been credited as important reasons why industrial workers are large milk consumers. Exceptions to the influence of income are numerous. In one school, low income may be the reason for low milk sales, whereas in another, low income may have no apparent effect. In one case the low income of a neighborhood was credited with making an otherwise unpromising vending location a very good sales outlet. Here women working in offices' received relatively low wages, but per capita consumption of milk was high. It was reasoned that employees saved lunch expenses by bringing sandwiches from home and purchasing a carton of cold milk at the office.

Innovation

The inquisitive nature of people, which induces them to try novelties, has a considerable effect on vending. The University of Maine study (20) reported an early build-up to a peak of sales during the first week a vending machine was on location, followed by a decline to a plateau of sales supported by regular customers.

In West Virginia a study (6) conducted over a 22-month period indicated that sales of milk through vending machines declined after the first few months of operation and in several cases, during much of the period the machines were in use. These declines did not seem to be related to declines in the number of employees or the number of hours worked per week, where it was possible to obtain this information.

Time Available

The amount of time which potential customers have for visiting the machine is important. In a factory or other place of employment it is obvious that potential customers cannot buy unless they have adequate opportunities to visit the machine.

The time allowed for lunch and for work breaks, and whether relief is provided workers who operate continuously-running machines have definite effects on sales through the vending machines. When customers are pressed for time, automatic machines are desirable because they vend units rapidly.

The study in West Virginia (6) showed that the speed of vending milk to students with automatic machines was more than double that for the manually-operated, semi-automatic machines. Speed is especially important when recess periods and intervals between classes are short.

Day-of-Week

The wide fluctuations in day-to-day sales is a troublesome characteristic of milk vending. In the University of Maine study it was reported that each location appeared to have its own pattern for sales. Cafeteria sales were the least variable, and shoe factory sales were the most variable.

In the Maine study (20) sales varied from day-to-day for many reasons. Among them were: weather, mechanical breakdown of vending machines, holidays, and week-end shut downs. Variations in sales ranged from 30 percent to 190 percent of the previous day's sales. Monday sales were from 85 to more than 400 percent of Friday sales. With such unpredictable patterns of consumption prevailing, considerable judgment and good maintenance procedures are required in order to have an adequate supply of fresh milk in the machines at all times.

Hour-of-Day

Conditions of location, employment, and other factors have a real bearing on the hour when peak sales are made. In most locations sales are heaviest at mid-morning, noon, and mid-afternoon, during rest or refreshment periods and during the noon meal time. Although many areas may experience a different demand schedule, the Maine study (20) reported that the largest sales occurred at the mid-morning and mid-afternoon refreshment periods. Noon sales for drinking with "dinner-pail" lunches, also ranked high.

In the West Virginia market area 92 percent of the habitual milk drinkers bought vended milk for between-meal snacks. Of these, 41 percent reported that they drank milk "regularly" and 59 percent did so "once in awhile" (6). It was noted that this sales pattern emphasizes the refreshment market which vending machines can tap.

Competing Beverages

In a study conducted in West Virginia (6) data were obtained to compare vended milk[6] sales with vended hot drinks,[7] cold drinks,[8] and candy[9] for a 16-month period. Vending of the above products was introduced almost simultaneously at three locations in a large industrial plant.

[6]Includes chocolate milk or drink, homogenized milk, and buttermilk.
[7]Includes coffee, hot chocolate, and soup.
[8]Includes cola and orange either carbonated or non-carbonated.
[9]Includes candy, chewing gum, mints, cookies, and cracker-peanut butter sandwiches.

Milk and hot drinks were sold at 10 cents per unit, while cold drinks and candy were vended at five cents per unit. Milk sales declined during much of the period but showed a slight upward trend toward the end of the period (Figure 1). Hot drink sales showed a rising trend during the first nine months of the period and turned downward thereafter. Cold drink sales declined during the first half of the period and, following this, rose irregularly. Candy sales varied irregularly during the first half of the period and then trended downward.

In this plant, the decline in the sale of milk and other products sold through vending machines was not attributed to declines in either the number of employees or the hours worked per week. During the period of the study, the number of employees increased slightly and the hours worked per week per employee were above or equal to the mean for the period as often as they were below the mean (see Figure 2). In all cases, the percentage variations were small.

Unit sales of each item each month expressed as a percentage of all unit sales during the same month are shown in Figure 3. The five-cent items accounted for a larger percentage of unit sales than did the ten-cent items. A decrease in cold (soft) drink sales in the winter months seemed to be offset, in part, by candy sales. During the early part of the period, hot drink sales increased as milk sales declined. Toward the end of the period, milk sales were rising while hot drink sales were falling slightly. Gross sales revenue from milk was lower than from the competing products during most of the period considered.

In the Berkeley County, West Virginia, market area (6), milk vending machines in most plants were in competition with other vending machines. Eleven of the 12 plants had soft drink vending machines, and three had coffee vending machines. Interviews with a sample of plant employees revealed that in the plants having soft drink vending machines: 52 percent of the employees drank both milk and soft drinks; 22 percent drank only soft drinks; 11 percent drank only milk; and 15 percent drank neither beverage.

The 74 percent of the employees who used the soft drink machines used them more frequently than milk drinkers used the milk vending machines; about five employees in ten bought soft drinks one or more times a day in the month preceding the interview.

In plants having coffee vending machines: 31 percent of the employees drank both milk and coffee; 31 percent drank only milk; 17 percent drank only coffee; and 21 percent drank neither beverage.

In these plants about six coffee drinkers in ten used these coffee vending machines one or more times a day in the month preceding the interview. A more exact measure of the competitive effect of the coffee


PERCENT
130
120
110
100
90
85
80
MILK
CANDY
COLD DRINKS
HOT DRINKS
A M J J A S O N D J F M A M J J
1956
1957

FIGURE 1. Milk, candy, cold drink, and hot drink sales through vending machines at three locations in an industrial plant, Berkeley County, West Virginia. (Monthly unit sales of each item expressed as a percentage of average unit sales of the same item for the period April 1956 to July 1957. Data smoothed by five-month moving averages.) Source: Clarke, James H., Mardy Myers, and J. Scott Hunter, Milk Vending—A Market-wide Evaluation in Berkeley County, West Virginia, Bulletin 429, West Virginia University Agricultural Experiment Station, June 1959.

machines is provided by a comparison of milk consumption rates in plants with and without such machines. In plants with coffee vending machines, 62 percent of the employees drank milk compared with 67 percent who drank milk in the plants where no coffee machines were available. The per capita consumption of milk was nearly 25 percent lower in plants where coffee as well as milk was available.

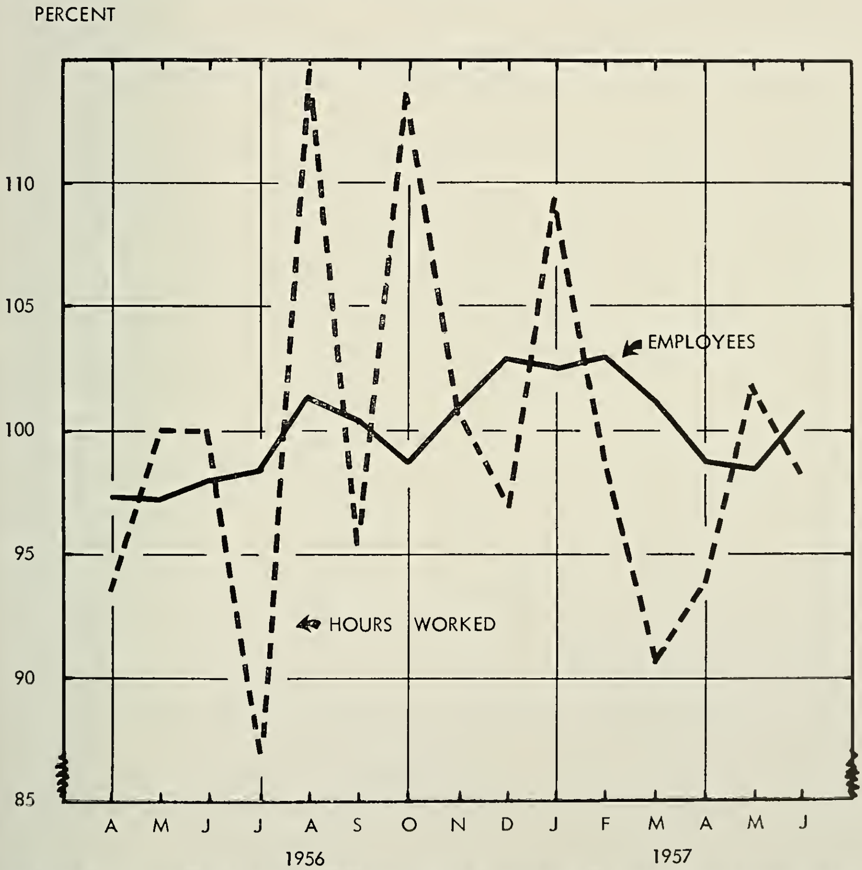


FIGURE 2. Number of employees and hours worked per week, industrial plant, Berkeley County, West Virginia, April 1956 to June 1957. (Number of employees per month and average hours worked per week for pay periods nearest the fifteenth of each month expressed as a percentage of the means of the respective items for the entire period.)

PERCENT
40
35
30
25
20
15
10
COLD DRINKS
CANDY
HOT DRINKS
MILK
A
M
J
J
A
S
O
N
D
J
F
M
A
M
J
J
1956
1957

FIGURE 3. Milk, candy, cold drink, and hot drink sales through vending machines at three locations in an industrial plant, Berkeley County, West Virginia. (Monthly unit sales of each item expressed as a percentage of monthly total unit sales of all items for the period April 1956 to July 1957. Data smoothed by five-month moving average.) Source: Clarke, James H., Mardy Myers, and J. Scott Hunter, Milk Vending—A Market-wide Evaluation in Berkeley County, West Virginia, Bulletin 429, West Virginia University Agricultural Experiment Station, June 1959.

A Wisconsin study indicated that milk apparently is able to more than hold its own in competition with other vended drinks. According to reports by Cook (8 and 9), after vending machines have been installed, milk may replace some soft drink sales in industrial plants. In March 1950, in a dairy plant where a dealer installed a milk vending machine beside a soft drink vending machine, only 100 bottles of the soft drink were vended, whereas 1,680 units of dairy drink, chiefly chocolate milk, were vended. The volume of soft drink sales prior to installation of the milk vending machine was not available, but it was estimated that soft drink sales formerly had approached 1,600 to 1,800 bottles during the winter months. A similar substitution of dairy drink for soft drinks was reported in a woodworking shop where, during a five-day period, one case (24 bottles) of soft drinks was sold through the vending machine as compared with about 500 units of dairy drinks. Previously, at that location, about 20 cases of soft drinks had been sold weekly. On the Cornell campus, soft drink vending machine sales dropped to one-fourth their former volume when milk vending machines were located nearby (9).

In a Maine study (20), the installation of a vending machine resulted in a noticeable decline in soft drink sales, though combined sales of milk and soft drinks increased slightly. In a Vermont study (30), soft drink sales were cut in half during the test of vended milk. In 1952, vended sales on the Sampson Air Force Base (7) in upstate New York were divided as follows: 454 soft-drink machines sold 820,000 bottles of cola; 29 fruit juice machines sold 30,000 cans of fruit juice; and 19 milk machines sold 80,000 half-pint containers of milk and chocolate milk.[10] Finally, a report by the University of New Hampshire (21) states that, with milk vending machines in operation, the 1952-53 sales of soft drinks in university dormitories dropped one-third below those in 1951-52, and were 59 percent lower than in 1950-51 when no milk vending machines had been in use. These examples, taken from different areas and reflecting unlike influences, support the theory that milk can compete with other drinks under many conditions.

[10]Dairies had 4 percent of the machines but did 15 percent of total dollar gross.

Lunch Consumed at Work

According to the survey report of the Farmer Cooperative Service (28), at locations where workers bring their lunches vending may increase the consumption of milk.

Price of Milk

In the studies reviewed, data on prices were limited. However, most sales were in half-pint containers at a price of 10 cents per unit. In the Maine study (20), there were occasional changes in price to test the effect on sales. Maine reported that dropping the price from 10 cents to 5 cents per half-pint increased sales volume 8 percent. Increasing the the price from 5 to 7 cents resulted in a 7 percent decrease in sales volume. Although these prices were in effect for only four and two weeks respectively, results indicate that milk had a low price elasticity at prices under 10 cents per half-pint.

In a South Carolina study (3), daily sales declined from 163.0 to 85.3 third-quarts (47.7 percent) when price was increased from 12 to 15 cents per unit. This indicated an elastic demand (—2.8). Daily sales increased from 85.3 to 102.3 third-quarts (19.9 percent) when price was reduced from 15 to 12 cents per unit, indicating an inelastic demand (—0.82). When price was reduced from 12 cents to 10 cents per third-quart, daily sales increased from 102.3 to 163.6 units (59.9 percent). Again, this indicated an elastic demand (—2.5).

Most of the studies of the effect of price on sales were for short periods of one or two weeks, and, therefore, several factors other than price may have influenced the quantities purchased.

Availability of Change

The installation of coin changers is a definite factor in achieving an increase in the sale of milk through vending machines. Sometimes in the schools such units were the source of most of the trouble with machines. The trouble might have been avoided if there had been a mechanic available for repairing machines and if proper advance instruction on machine operation had been given to the children.

Location of Machine

There is general agreement that proper location of machines is one of the most important factors for success in milk vending. However, few guides are available to aid the operator in selecting best locations.

Although vending machines can be moved from one location to another with little difficulty, changes in location should be kept to a minimum. A machine used to test a location that later proves to be unsuccessful incurs losses which either must be absorbed by gains from

other locations or must be met by using other funds. It is essential, therefore, to appraise all locations carefully before placing a machine.

In some cases site owners, especially industrial site owners, impose restrictions on the location of machines. Some of the larger factories require a vending machine to be located in each department in order to minimize time lost by workers patronizing the machine. While the average milk dealer's funds for purchasing machines may be limited, he should not overlook the possibility of servicing locations with smaller, less expensive, manually-operated vending machines. This lower investment soon can be liquidated in a reasonably profitable location.

A report from the University of Vermont (29) made the following comments regarding favorable factory locations which they had tested:

1. Most employees were in the young adult age group.
2. The only real competition was from soft drink machines.
3. No competing food service facilities were available.
4. Management of factories was aware of the beneficial results of of having milk available.

Although these favorable conditions might not be repeated in their entirety in other locations, something approaching them might be objectives possible of attainment.

The effectiveness of vending machines for selling milk is based, in part, on impulse or spur-of-the-moment buying. Consequently the machines must be placed where they will attract the interest of customers. This is accomplished by placing machines conspiciously, in areas where potential customers congregate or pass regularly. Machines should be placed so that they constantly remind customers of the products for sale, and so that it is convenient to purchase and consume the product. Signs and bright colors are suggested as promotional devices to attract attention to a machine and the products it vends.

In Vermont it was reported (29) that 70 percent of those who bought milk from a vending machine in a small factory did so because milk was available.

In a report from Clemson Agricultural College (4) it was noted that impulse sales accounted for a large portion of vending business. In one instance, volume of sales dropped 32.7 percent when a machine was moved from a heavily traveled spot to an out-of-the-way location only 50 feet away. It has been found that in schools it is best to place vending machines in a central location in a corridor.

The State Department of Agriculture, Olympia, Washington, suggests (23) the following as points to consider in locating milk vending machines:

1. Traffic Pattern
   a. How many people
   b. Refreshment consumption habits
      (1) Nationality
      (2) Age
      (3) Economic status of the people
   c. Type of work or activities—
      Heavy physical exertion means more dairy drinks are consumed
2. Time available for using machines
   a. Employer attitude (amount of time permitted)
   b. "Break Periods"
   c. Congestion around machines
3. Cost of supplying milk to machines at times needed
4. Size of equipment necessary (don't waste space)

Although some of the above guides may not be applicable in a given situation they indicate the importance of proper location and suggest caution against a hasty decision in placing milk vending machines. "Researching" a given site is an essential first step.

Drink Selections Offered

Operators of indoor vending machines usually offer milk,[11] chocolate milk or drink, and a third or fourth beverage. A nation-wide study (28) in 1955 disclosed that one of five operators offered buttermilk along with milk and chocolate milk, and almost as large a proportion offered orange drink. One of every four operators offered both buttermilk and orange drink. Thus, two of every three operators had at least one major product in addition to milk and chocolate milk. Orange drink and buttermilk did not represent large volume items. Often they had but limited, sectional, or seasonal appeal. When the volume of chocolate milk or drink sales dictates, more than one of the selections may be assigned to the chocolate product.

Sometimes orange drink and buttermilk can be obtained at a lower unit cost than milk, and since the machine price is the same as for milk, the vending margin[12] is greater for these items.

[11]Milk, when used in this report in connection with the variety of products vended, means fresh whole milk. It is usually pasteurized and homogenized, and may or may not have vitamins and/or minerals added. In other reports it is sometimes referred to as *white milk, regular milk,* or *sweet milk.*

[12]Vending margin is the difference between the wholesale price paid for the vended product by the vending machine operator and the retail price at which the machine delivers the product to the consumer.

There is definite evidence to support the belief that a wide selection of drinks will increase the total sales. The exact number of selections to offer has not been established at present. Probably the best combination of products for a particular location can best be determined after the machine is placed on location and tried.

Usually chocolate milk will outsell milk. The volume ratios among the different products vary at different locations and in different areas. The Missouri report (1) indicates that the preference for chocolate milk ranges from being on equality with milk to as much as a 9 to 1 ratio over milk. Personnel of military bases in South Carolina (24) and Utah (7) showed a 2 to 1 preference in favor of chocolate milk over milk. In South Carolina (24) factory workers showed a slight preference for milk over chocolate milk. Workers in a West Virginia bakery likewise preferred milk to chocolate milk (6).

Total sales volume at Clemson Agricultural College (4) declined as much as three-fifths when only milk was offered in place of both milk and chocolate milk. On the other hand, when chocolate milk was offered in place of both chocolate milk and milk, total sales declined only about 10 percent. However, some school authorities do not encourage, and in some cases do not permit, the sale of chocolate milk in schools.

In Maine (2) offering both chocolate milk and milk increased total sales.

A report of the Ohio Agricultural Experiment Station (25) indicates that more milk is consumed by school children when they have access to chocolate-flavored milk as well as to milk. In one school location in West Virginia (6) when both chocolate and homogenized milk were vended, the ratio was 15.6 chocolate to 1.0 homogenized even though the chocolate was sold at 5 cents per half-pint and the homogenized at only 3 cents per half-pint. After the change to vending machines and chocolate milk, sales averaged 21.8 percent higher at this school than during the preceeding school year but attendance was also 11.3 percent higher.

In a West Virginia market area (6), when only chocolate milk or drink and homogenized milk were offered in industrial plants and offices, the ratio of chocolate to homogenized milk was 2.4 to 1.0 in 15 locations covering in total 119 monthly records. However, the ratios varied from 0.7 chocolate in one location to 19.5 chocolate to 1.0 homogenized milk in another location.

When chocolate milk or drink, orange drink, and homogenized milk were all offered through the machines in 15 locations, covering in total 103 monthly records, the ratios were as follows: 2.3 chocolate, 0.8 orange, and 1.0 homogenized.

Chocolate milk or drink, buttermilk, and homogenized milk were offered at five locations covering in total 61 monthly records. At these locations ratios were 2.6 chocolate, 0.3 buttermilk, and 1.0 homogeniged.

In a Connecticut study (13) sales through 181 vending machines were 37 percent chocolate milk and 63 percent milk.[13]

A modification in the preference pattern occurred in a program of vending started in the University of New Hampshire dormitories in 1951 (21). For the first two years milk and chocolate milk were sold; after that coffee-flavored milk also was included. With two choices, women used 51.9 percent milk and 48.1 percent chocolate milk, and men used 32.8 percent milk and 67.1 percent chocolate milk. With three selections of milk in the machines, women used 43.1 percent milk, 35.1 percent chocolate milk, and 21.8 percent coffee-flavored milk, and the men used 30.5 percent milk, 34.8 percent chocolate milk, and 25.8 percent coffee-flavored milk. The addition of coffee-flavored milk dropped the sale of milk slightly, but the greatest change was from chocolate milk to coffee-flavored milk.

As far as could be noted from an analysis of the data available, there was little evidence that new kinds of beverages would be vended through these machines. Except for limited sectional preferences for flavored milk other than chocolate, the market seems to be satisfied to have milk and/or chocolate milk or drink. There is a limited demand for orange drink and buttermilk. There is no evidence that the manufacturers of of milk vending machines are endeavoring to design units which provide a wider selection of products, nor do sales reports indicate a need for a larger number of selections.

Quality of Product

One of the chief reasons given by consumers for using milk vending machines is that they liked the quality of the product. Apparently by quality they meant not only freshness and flavor but also a uniformly even temperature of the milk.

Moore, of the University of New Hampshire, has indicated that people do not use milk machines unless they like the flavor of the product.[14] He states that quality is still the most important factor for increasing milk consumption. A Vermont study (29) showed that sales of chocolate drink in one location fell to practically nothing as a result of a change in the formula used in preparing the drink. After a change back to the regular formula, nearly two weeks passed before sales of the chocolate drink reached their previous level.

[13]These machines were mainly in factories (133 out of 181), indicating a preference related to occupation.

[14]Moore, H. C., personal letter, June 15, 1959.

Dependability of Supply

Successful vending machines must be dependable and troublefree. One of the quickest ways to discourage patronage is to have a customer find the machine empty or out of order. The vender is a "silent salesman," but when the machine is empty its "silence" is paralyzing (7).

Many locations have peaks in their use patterns. These peak periods must be determined if the consumer is to be served satisfactorily. One of the operators serving machines in New York City solved this problem by putting in each machine a recording device which gave information as to what time of day people made purchases (13). With this information, the operator was able to schedule deliveries to meet demand peaks. Other methods might be devised for determining the demand schedule. But no matter how determined, time will be wasted unless the findings are observed in maintaining an adequate supply of milk.

Other Sources of Milk

In the Clemson study (3) it was reported that vended milk apparently has little effect on consumption of milk from other sources. Sales from a vending machine appear to be "plus" sales. Milk sold through other outlets often is said to present no serious problem for vending milk. Proof of this assertion is not extensive. It has been noted that, where a cafeteria is available, vending machines generally register most of their business after the cafeteria is closed. The Maine study (20) showed that total milk sales at two locations increased after vending was introduced, but that counter sales of milk apparently were reduced slightly after vending machines were installed.

Ratio of Consumers to Machines

Operators do not agree on a desirable ratio of consumers to machines for either the fully-automatic or the manually-operated machines. The figure most commonly mentioned for the fully-automatic machine in industrial locations is 200 persons (28). Generally, daily per capita consumption appears to range from one-third unit to one unit per person. The minimum number of customers per machine for the manually-operated machine to operate profitably ranges from 75 to 200 because of the low original cost and the low operating expense. The number of potential customers, however, is not the only factor responsible for gain or loss in a milk vending operation.

Kind of Business

As shown earlier in this report, industrial plants provide the location for most of the indoor milk vending machines. Patterns of distribution, however, varied in different sections of the country.

According to the report of the Farmer Cooperative Service (28), nine out of ten operators had vending machines in industrial plants. Two-thirds of all machines were in such locations. Office buildings were the next most popular location. Of the four locations (high school, shoe factory, cafeteria, and recreation room) used in the Maine study (20), the high school had the lowest and the shoe factory had the highest sales volumes.

Automatic vs. Manually-Operated Machines

Factors such as total daily sales, peak periods of sales, types of people, requirements imposed by the location management, and needs for extra servicing—all must be considered when a vending machine is chosen for a given location. If the total daily sales can be anticipated, the size of machine needed can be determined more accurately.

If many sales must be made in a short period of time, the automatic type machine with its rapid delivery of product and its fairly large capacity, is better suited than the slower and small-capacity manually-operated machines.

The favorable and unfavorable characteristics of the two common types of indoor machines listed by Sykes (29) are shown below since it is impossible to state specifically when each type is to be preferred. Obviously, each situation will determine the relative importance of these characteristics in making a decision to buy.

Manually-Operated Vending Machines

Advantages

1. Low initial cost
2. Low investment per unit of capacity
3. Can be moved easily from one location to another
4. Adaptable to locations where volume is apt to be low
5. Adaptable to either glass bottle or paper cartons
6. Simple construction and easy to repair
7. Provides storage space for additional product

Disadvantages

1. Not entirely tamper proof
2. Small capacity (vending level)
3. Slow vending speed
4. Difficult or impossible for children in early school grades to operate

Automatic Vending Machines

Advantages

1. Rapid vending cycle
2. Large volume capacity
3. Tamper proof
4. Less time needed to service

Disadvantages

1. High initial cost
2. High investment per unit of capacity
3. Need factory-trained repairmen
4. Difficult to move

Other Observations

Appearance of the machine also was found to be an important consideration. In one location in Utah a vending machine was repainted and suitable signs and posters displayed. A sales increase of 300 percent followed (7). Arousing interest with well-conceived methods of publicity has aided operators in introducing vending machines where basic conditions justified their installation.

The size of container was another factor affecting sales. In Utah (7), it was noted that the half-pint container was preferred among store clerks and office employees, while a larger container was popular at military and industrial locations. At Clemson College in locations such as classroom buildings, college students preferred half-pints of milk, whereas in dormitory locations pints led in popularity (3). At Massachusetts Institute of Technology McConnell reported (7) that his firm was surprised to find students believed it more economical to buy a quart of milk for 25 cents than to pay 10 cents for a half-pint. Unit sales of quarts exceeded the previous sales of half-pints but retail deliveries of quarts were discontinued at the same time.

FACTORS AFFECTING SALES THROUGH OUTDOOR MACHINES

Although vending milk through outdoor machines is less common than indoor vending, it is increasing in some areas and in other areas is well established (5). However, the trend toward outdoor vending of milk is so recent that little published material concerning it is available. For that reason the following section of the report dealing with outdoor machines is much more limited than is the section on indoor vending.

Location of Outdoor Machines

Location guides for outdoor vending machines stress the importance of easy accessibility, of ample parking space, of heavy traffic, and of large nearby population.

Additional requirements are that machines should be located in conspicuous places and that they should be easily accessible for servicing. Automobile service stations were found to be the most common location (5).

Density of Population

Research and studies related to density of population have been limited to large vending machines in the Midwest. For successful operation, Bonde indicates there should be a minimum population of 4,000 within a mile radius of the machine (7). Apparently a concentration of population is more important than heavy motor traffic. Transient traffic does not provide the necessary volume of sales for large vending machines.

Availability of Change

The Land O'Lakes Creameries, Incorporated, in Minneapolis, Minnesota, was among the earliest users of outdoor vending machines. They report that more than 50 percent of their customers came to the machines with insufficient small change. This situation encouraged the location of vending machines near gas stations or places of business where attendants were avaliable for making change. This report indicates that the cost of installing coin changers may be justified.

Size of Container

The quart size paper container appears to be the most popular for out-of-door machines. Most large vending machines can be adjusted to vend two quarts together and thus offer milk on a half-gallon basis. Some indoor vending machines have been enclosed for outdoor use, and through them the half-pint container has been found to be popular for customers who buy milk as a refreshing beverage, rather than for home consumption. Some machines of this type vend both half-pints and quarts, thus serving both the transient and home-use demand for milk.

Quality and Cleanliness

With outdoor vending as with indoor vending, the same considerations for quality prevail. A constant low temperature of 33 to 36° F. preserves the quality and flavor of the milk and thus encourages sales.

Clean, spacious, well-lighted surroundings attract customers and obtain repeat sales. Machines must meet requirements of boards of health.

Dependability of Supply

Frequency of milk deliveries to machines and size of storage compartments in the machines are directly related to sales volumes. In order to insure a continuous supply, special attention should be given to the

relationship of storage capacity to frequency of stocking a machine with milk.

It has been found that on a three-times-per-week delivery schedule, with a machine averaging sales of 400 quarts (200 half-gallons) per day, storage space for approximately 1,000 quarts (500 half-gallons) is advisable. To increase the frequency of delivery would reduce the required storage capacity but also might result in an increase in total costs.

Hour, Day, and Season of Year

The hours of greatest use of outdoor vending machines will vary according to the characteristics of the area and the habits of the people in the locality. A general observation is that the milk should be accessible 24 hours a day. If this is not possible, the machine should be operated at least from 6 a.m. to 10 p.m. The largest volume of milk is sold from 4 to 6 p.m. daily according to Bonde (7). Saturdays and Sundays are usually the days of highest sales volume. One New Jersey operator reported that 60 percent of the total sales for the week were made between Saturday noon and Sunday midnight (13).

The study of New Jersey outdoor vending machines (5) revealed there was some seasonal variation in the milk sales per machine. The high month of sales was August when an average of 38 quarts per day was sold per machine, as reported by 47 operators. The same group had lowest sales in February with 21 quarts per day. There were 21 operators with annual sales of more than 10,000 quarts per machine. This group had highest average daily sales of 52 quarts per machine in August and lowest in February with 29 quarts per machine. Twenty-six operators with annual sales of less than 10,000 quarts per machine had highest sales of 27 quarts per day in July, and lowest sales of 14 quarts per day in February.

Existence Known

Sales at new outdoor locations develop their potential slowly. It takes a few months for the residents of a neighborhood to learn of the new milk supply and begin to use it habitually. In most cases point-of-sale and word-of-mouth publicity have been relied upon to introduce the new vending machines. In some instances, apparently, more intensive publicity has been avoided because of an anticipated adverse reaction of retail outlets which are wholesale customers of the same dairy.

Costs and Returns

MACHINE COST

The total dollar cost of milk vending machines varies depending on such things as the location of use (indoor or outdoor), type of oper-

ation (automatic or manual), capacity (vending and storage), number of selections, and the number and type of coin mechanisms supplied.

DEPRECIATION

The general practice is to depreciate vending machines over a period of five years. This basis was used at the University of New Hampshire, and also was reported in a study (29) published by the University of Vermont. In New Jersey the operators of outdoor vending machines estimated the average life of a machine at eight years (5). Recent depreciation schedules published by the Internal Revenue Service do not list vending machines.

LICENSES AND FEES

Licenses, fees, and miscellaneous regulations tend to be of local and state origin. In some states and cities, special licenses are required to operate vending machines. Permits to retail products are sometimes required. In West Virginia each machine selling chocolate milk or orange drink also is subject to a soft drinks permit (6), and, in addition, there is a special soft drinks tax on chocolate milk and drink and on orange drink. In some states sales taxes must be paid on vended products in addition to other taxes and licenses.

FINANCING

The typical methods of financing are available to purchasers of milk vending equipment. Many, of course, use the facilities of local financial institutions, and others make such arrangements with the manufacturer of the equipment. *Vend's* 1957 Census of the Industry states that 35 percent of the operating companies with milk vending machines reported that their dairy suppliers had helped to finance the purchase of the machines (26).

COMMISSIONS

The owner of the site usually required a commission payment for the space used and services furnished, although he was not always the recipient of the payment. This is particularly true in plants where there are many workers. Such commissions are also paid to the management of many apartments, owners of gasoline stations, and to public schools on whose properties vending machines are located. Often these payments are made to employees' welfare or recreational funds and may thus benefit both the industrial concern by improving relationships with workers and the vending operator as well. Whenever customers get such commissions, through their welfare funds, the benefits help to increase sales through milk vending machines.

The commissions appear to vary from nothing to 20 percent of gross sales (28). Cook (8) reports that specialized operators with many machines tend to pay relatively low commissions. Commissions paid to location owners in August 1955 are shown in Table 2. Ten percent appears to be the most widely used rate (28).

The second most common method of computing payments is a sliding scale of payments related to the volume of sales. According to this method, the rate of commission paid increases as the sales volume increases.

The sliding scale method has the advantage of not obligating an operator to pay a commission unless the sales volume reaches a certain level. The Farmer Cooperative Service reported that greater use of the sliding scale method of paying commissions might help specialized operators avoid low-volume, unsuccessful locations (28). The Service reported that one-third of these specialized operators, as compared with one-fourth of the milk distributors, used a sliding scale. One arrangement reported was for the operator to pay one-half cent per unit on 100 or fewer sales per day and one cent per unit if sales were more than 100 per day per machine (28).

In Minneapolis filling stations, the operators paid to the owners of the station a location rental on outdoor venders of one-fourth cent per quart (13).

The above are limits within which, depending on local conditions, a suitable rate of commission should be determined.

TABLE 2. COMMISSIONS PAID TO LOCATION OWNERS BY VENDING MACHINE OPERATORS, AUGUST 1955

Rate of Commission As Percent of Gross Sales	Milk Distributors*		Specialized Operators**	
	No. of Operators Reporting	Percent of Total No. Reporting	No. of Operators Reporting	Percent of Total No. Reporting
None	1	1.2	5	5.9
Fixed percentage				
0.1-4.9	3	3.8	1	1.2
5	13	16.3	14	16.7
5.1-9.9	2	2.5	4	4.8
10	36	45.0	29	34.5
10.1-14.9	1	1.2	1	1.2
15	0	....	0	....
More than 15	3	3.8	1	1.2
Sliding Scale	20	25.0	29	34.5
Monthly rent	1	1.2	0	....
Total	80	100	84	100

*Principal activity is conventional distribution of milk.

**Principal activity is automatic merchandising.

Source: Spurlock, Hughes H. and Donald E. Hirsch, *Vending Milk in Small Containers by Cooperatives and Others,* Farmer Cooperative Service Circular 20, United States Department of Agriculture, Washington 25, D. C., March, 1957, p. 29, Appendix Table 9.

REPAIRS

The cost to operators and the inconvenience to customers caused by repairs are important to vending machine operators. In the Clemson study a three-hour training period with one of the manufacturer's representatives was held before machines were placed on location. Most difficulties were overcome readily as a result of this training (4).

Not all operators are able to obtain the services of manufacturers' representatives. Neither do operators with a small number of machines require a full-time mechanic. Yet each operator should provide for the necessary repairs in accordance with the factors peculiar to his local situation.

BREAK-EVEN POINTS

The break-even point[15] for each vending machine depends on several factors such as the number of machines owned by the operator, fixed services for which he bears the cost, the degree to which he is specialized in the vending business, and others.

The Farmer Cooperative Service reported (28) that the average break-even point was 60 units per day for fully-automatic machines selling half-pints. For the third-quart sales in these machines, the break-even point was 65 units per day. For manually-operated machines, the average break-even point was 39 half-pints per operating day, and for machines vending the third-quart containers it was 43 units per operating day. In the Utah study (7), Morris and Hopson reported that 35 half-pints per day were required to break-even with the manually-operated machine.

Klein showed (17) the break-even points at different margins based on a West Virginia test operation (Figure 4).

For an outside vending machine, Bonde says (7) 200 quarts or 100 half-gallon sales per day probably are needed for a profitable operation.

In a report (20) published by the University of Maine concerning one automatic vending machine, it was estimated that annual operating costs were $500. When the selling price was 10 cents, an average gross margin of 2.2 cents was available per half-pint, if 0.5 cents per unit was allowed for commission to the location and 7.3 cents was allowed for product and container costs. With these margins and costs, minimum sales of 500 units per machine per week were required for profitable operation (break-even). The number of machines operated and the margin per unit affect the point where machines will break-even.

[15]The break-even point, expressed in units of product vended daily, is that point where the total gross margin between the selling price and the purchase price of the products vended is just sufficient to cover the fixed and variable costs at that volume.

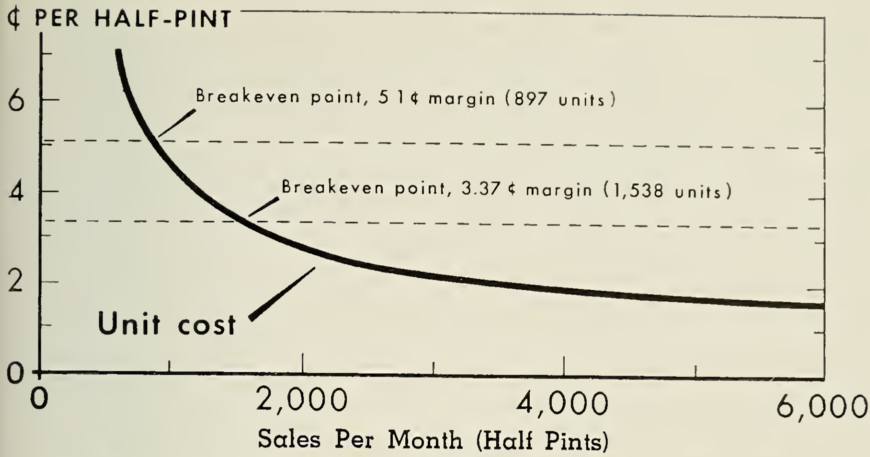


FIGURE 4. Average unit costs per half-pint for sales of dairy products through indoor vending machines and break-even points, per month, at selected margins, Martinsburg, West Virginia. Source: Klein, Jack E., Costs of Distributing Milk Through Vending Machines and By Retail and Wholesale Routes, Martinsburg, W. Va., Marketing Research Report No. 229, Marketing Research Division, United States Department of Agriculture, May 1958.

Other break-even points for automatic machines were 70 units per machine per day in 15 industrial plants in New York State and 60 units per day reported from experience by the Rowe Manufacturing Company (20). Wisconsin operators indicated (8) break-even points ranging from 50 to 100 half-pints with a midpoint of 65.

Price of the product vended has a bearing on sales and thus on the break-even point. Price has a bearing on the profit for the milk distributor as well as for the operator of the vending machines. As vending prices are lowered, vending sales rise, and the milk distributor sells more milk, even though the vending operator may have less margin on each unit.

The effect of price changes on sales, profits, and break-even points is reported in a Vermont study (29) during which an automatic vender located in an office was replaced by a manually-operated machine. The price was raised from five cents for six ounces, to ten cents for eight ounces of milk. This price increase reduced sales about one-half. Owing to higher investment costs in the automatic vending machine, sales from it during the first trial period had showed a very small profit. After the shift to the less expensive, hand-operated machine, profits increased markedly. More profit was made per unit, in the cheaper machine, partly because much smaller investment costs were involved. The hand-operated machine also was better adapted to the location than was the automatic machine because daily sales volumes did not warrant the

larger, more expensive machine. On the other hand, all the increase in profit should not be attributed to the shift in type of machine since both the price and quantity vended were changed. Part of the gain may be attributed to the inelastic demand for fluid milk.

The Farmer Cooperative Service study (28) also noted that with both types of organizations selling half-pints for ten cents, specialized operators had slightly lower break-even points for both fully-automatic and manually-operated machines than did the milk distributors. Figures indicated that specialized operators, as a group, operated machines more economically than did milk distributors. However, the specialized operators had a larger volume from which they might realize net margins, and they had proportionately fewer machines with sales of less than 30 units a day. They also had more machines with sales averaging more than 150 units daily.

The high investment in the automatic type machines results in a high fixed cost rate. Daily net profits of the automatic and the hand-operated machines are compared in a Vermont study (29). The daily profits from the sale of the first units sold must be credited to the payment of the daily fixed costs. After these and the accompanying variable costs have been met, the machine has reached the break-even point. Break-even points for the three types of venders are shown in Table 3. It is assumed the machines operated 250 days a year, selling half-pint cartons for 10 cents.

TABLE 3. DAILY PROFITS FROM MILK VENDING MACHINES*

Type of Machine	Cost	Daily Fixed Cost	Sales per day (½ pt. at 10 cents)								
			10	20	30	40	50	60	70	80	90
					(dollars)						
Hand Operated carton-type	300	.30	Break even	.30	.60	.90	1.20	1.50	1.80	2.10	2.40
Automatic carton-type	600	.60	—.30	Break even	.30	.60	.90	1.20	1.50	1.80	2.10
Automatic bulk-type	875	.875	—.50	—.13	.24	.62	.99	1.36	1.73	2.10	2.48

*Assume operation 250 days per year.

Source: Sykes, James G., *Milk Vending in Vermont*, Bulletin 592, Vermont Agricultural Experiment Station, Burlington, Vermont, June 1956.

TOTAL COSTS

Johnson, of the University of Connecticut, reports (7) costs in 12 installations for vending operations in Minneapolis, Minnesota. There the costs were 2.15 cents a quart for supplying and operating the vending machines during the period January to June 1953, compared with 2.43 cents per quart for operating wholesale routes supplying retail stores.

Klein (17) found the cost of distributing dairy products through vending machines was high in relation to the cost of their distribution on either every-other-day retail routes or wholesale routes in a West Virginia market. This high cost was expected because of the complimentary and marginal nature of the milk vending in relation to the other methods of distributing dairy products during the period of study. Costs per dollar of sale on the three model vending machine routes in this study ranged from about 1.5 to 3.5 times as great as for the model wholesale route.

The unit operating cost of a route serving outdoor vending machines was comparable to the costs of *daily* delivery to homes, the highest unit operating costs of all distribution methods observed (17).

In a more recent study (5) of 782 outdoor milk vending machines in New Jersey, Carncross found costs to be considerably higher. These costs are itemized in Table 4. The two most important costs were rental

TABLE 4. COST OF OPERATING 782 OUTDOOR MILK VENDING MACHINES IN NEW JERSEY
(Year Ending April 30, 1958)

ITEM	AVERAGE COST PER MACHINE
Depreciation of Machine	$145
Interest on Machine	25
Depreciation on Housing	35
Interest on Housing	6
Rental of Space*	269
Total Fixed Cost	$480
Servicing Cost	229
Truck Cost	81
Administration	50
Loss from Spoilage	20
Labor, Repairs and Parts	78
License and Tax	14
Total Operating Cost	$472
Interest on Costs	19
TOTAL ALL COSTS	$971
Total Selling Expense per Quart	$ .087
Quarts Sold per Day	31
Quarts Sold per Year	11,211
Total Number of Machines	782
Total Number of Operators	59

*Includes Electricity.

Source: Carncross, John W., *Cost of Operating Outdoor Milk Vending Machines in New Jersey*, Preliminary Report, New Jersey Agricultural Experiment Station, December 1958, p. 3.

of space (including electricity) and depreciation on the equipment. One reason per-quart costs were higher for the New Jersey operators than for those in Minnesota was that daily sales averaged only 31 quarts per machine in New Jersey (5), compared with 322 units (quart equivalent) per machine in Minnesota (7). The most important factor affecting the selling cost per quart was the annual volume of sales per machine (5). The inverse relationship between selling expenses (costs) and volumes sold is shown in Table 5. The wide range in the selling expenses of the 59 vending machine owners interviewed is shown in Figure 5. Costs ranged from a low of 4.2 cents per quart to a high of 51.7 cents. Daily milk sales per machine per operation also ranged widely from 5.1 quarts to 100 quarts (Figure 6). The relationship between selling expense per quart and the quarts sold per day is shown in Figure 7. Although there is a considerable range in selling expense per quart at the various daily volumes, the relationship between selling expense and quarts sold per day is definitely negative. Lower costs are associated with higher daily volumes and higher costs are associated with lower daily volumes.

Table 5. Relation of Volume of Milk Sales Per Year Per Vending Machine to Selling Expense Per Unit

Quarts Sold per Year		Quarts Sold per Day	Selling Expense per Qt.	Number of Operators	Number of Machines
Range	Average				
Under 8,000	5,759	16	$.162	15	90
8,000-9,999	9,198	25	.102	13	208
10,000-14,999	12,192	33	.080	19	373
15,000 and Over	18,654	51	.056	12	111

Source: Carncross, John W., *Cost of Operating Outdoor Milk Vending Machines in New Jersey*, Preliminary Report. New Jersey Agricultural Experiment Station, December 1958. p. 3.

In a recent Clemson study (3) it was reported that the most important items in cost in operating a milk-vending route were: (1) commission paid for location; (2) salaries paid delivery men and solicitors; (3) transportation; and (4) depreciation. During 1955, these four items made up 88.5 percent of the total cost for a 22-machine route operated by a milk dealer, and 75.8 percent of the total cost for a 38-machine route handled by a specialized-operator in South Carolina.

	MILK DEALERS (percent)	SPECIALIZED OPERATOR (percent)
Commissions	46	30
Salaries	20	26
Transportation	15	10
Depreciation	9	14

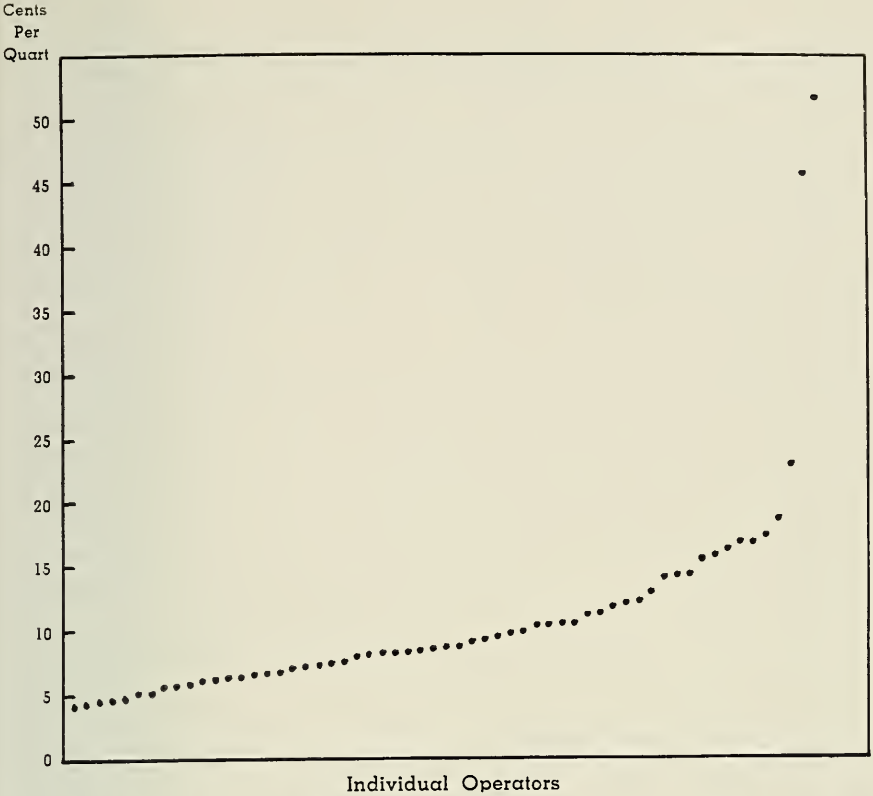


FIGURE 5. Selling expense per quart through 782 outdoor vending machines for 59 milk vending machine operators, New Jersey, May 1, 1957 to April 30, 1958. Source: Carncross, John W., Cost of Operating Outdoor Milk Vending Machines in New Jersey, Preliminary Report, New Jersey Agricultural Experiment Station, December 1958.

The difference between the costs for the two types of operations listed on page 38 indicates the difficulty which is experienced in trying to arrive at average cost figures.

VANDALISM

There is little indication that vandalism is a serious problem. Apparently it has been more common with manually-operated machines than with automatic machines. Often the temptation to steal or destroy can be met by placing vending units in an open, well-lighted area.

At the University of New Hampshire vandalism represented a loss of less than one-half of one percent. When vandalism became a problem, the operator emptied the machine and left it empty for a week (7). The students asked to have it restocked.

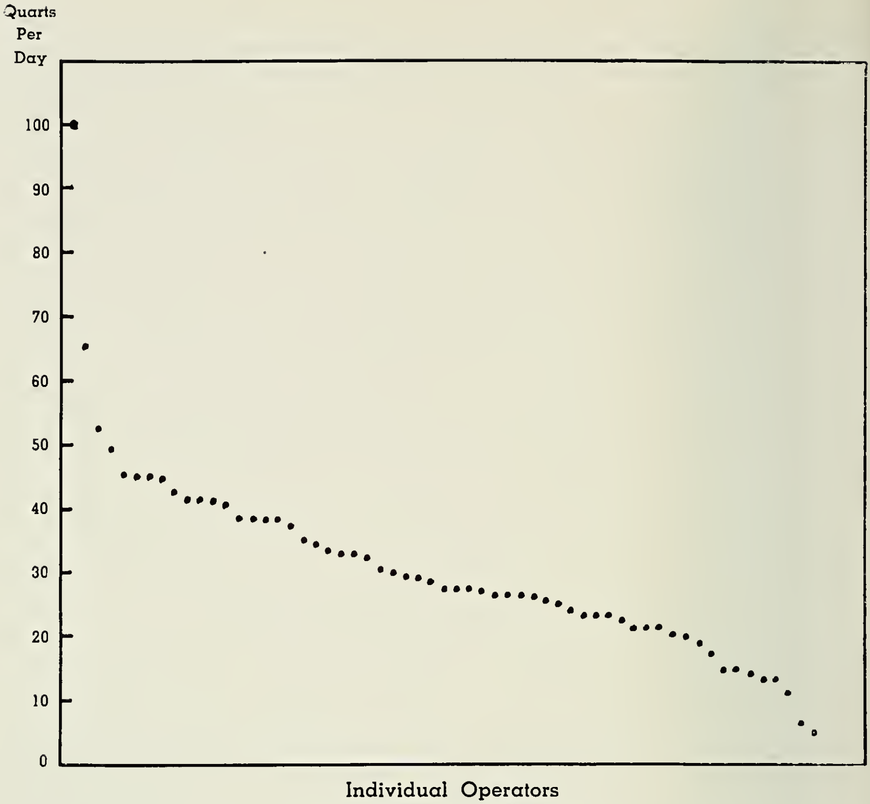


FIGURE 6. Quarts of milk sold daily through 782 outdoor vending machines for 59 milk vending machine operators, New Jersey, May 1, 1957 to April 30, 1958. Source Carncross, John W., Cost of Operating Outdoor Vending Machines in New Jersey, Preliminary Report, New Jersey Agricultural Experiment Station, December 1958.

A New Jersey distributor reported (13) that he carried complete insurance on all machines, including insurance on losses from vandalism. His insurance cost is $25 a year per machine. There is no general information that machine owners customarily carry insurance on their vending equipment.

EFFECT OF ADDING A VENDING OPERATION ON MILK DISTRIBUTORS' COSTS

Cook indicates that the promotional value of milk vending machines may receive primary emphasis from dealers, but that vended sales can be profitable when viewed as a means of spreading fixed costs (9). To illustrate, it may be assumed that certain expenses now being incurred by a milk plant would not change with an increase in volume of about 380,000

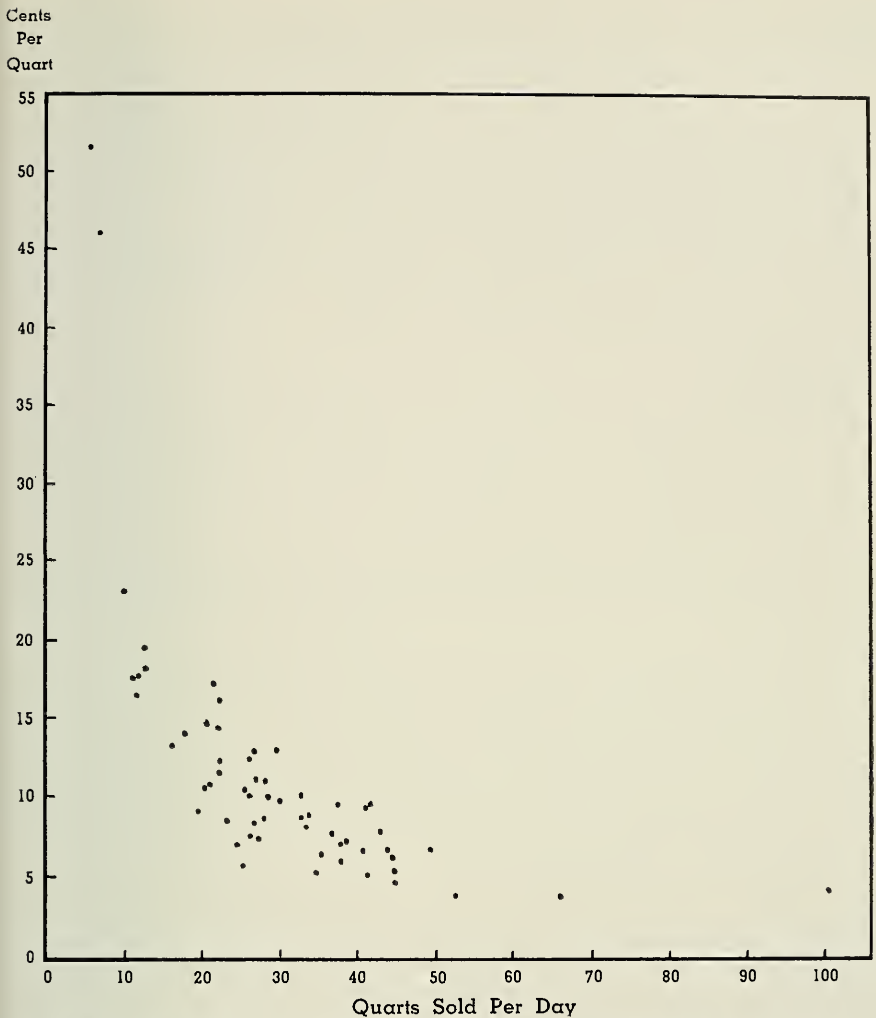


FIGURE 7. Quarts of milk sold daily and selling expense per quart for milk sold through 782 outdoor milk vending machines for 59 operators of milk vending machines, New Jersey, May 1, 1957 to April 30, 1958. Source: Carncross, John W., Cost of Operating Outdoor Milk Vending Machines in New Jersey, Preliminary Report, New Jersey Agricultural Experiment Station, December 1958.

pounds of milk yearly. Studies of milk plant operations repeatedly have shown that total receiving and pasteurizing expenses are nearly the same, up to a point where more labor must be employed or machinery added. Similarly total bottling expenses remain nearly the same except for bottles, paper cartons, production rentals, and cases. Distribution expenses remain nearly the same where trucks are owned by the dealer and

drivers are paid a daily rate, except for commissions above the base. On a per unit basis, therefore, these costs tend to decrease with volume.

Where a vending machine route is established, about 25 machines are required for efficient operation. Cook points out that probably 28 vender stops, without an extra driver, could be spread over the operations of a milk distributor who has three or four routes in operation (9). In this case installations must be grouped fairly closely or serving costs may be prohibitive. Mechanical service for the 28 venders requires an estimated 60 man-hours per month. This service could be performed by the regular plant mechanics, without overtime.

Regulations

Milk marketing is the subject of many federal, state, and local regulations. Pertinent regulations should be determined from local municipal and health authorities before arrangements are made for the purchase and installation of vending machines.

Local ordinances and regulations seldom constitute serious obstacles to the use of milk vending machines. Making certain of local provisions and complying with them, however, is essential and should be done in advance.

On July 19, 1957, the U. S. Department of Health, Education, and Welfare issued Public Health Service Publication, No. 546, *Vending of Foods and Beverages,* A Sanitation Ordinance and Code—1957 Recommendations of the Public Health Service. This suggested ordinance and code is for the guidance of those jurisdictions which are concerned with the sanitary control of vending machine operations, and it embodies the best information currently available on sanitary practices applicable to the design, construction, maintenance, and operation of vending machines. Probably it will be adopted by many jurisdictions inasmuch as it is based on the comments and suggestions of a representative number of local health departments, interested Federal agencies, and the vending machine industry.

Attitudes for and Against Milk Vending

CONSUMER ATTITUDES

Generally the consumer approves the use of milk vending machines. He likes cold, fresh milk, and he will buy from a vending machine if it is convenient, the mechanism is dependable, and the price is right. With today's well-designed machines and more experienced operators the consumer can rely on a machine to give dependable service. Convenience and the retail price of the milk usually are within the control of the

operator. If any or all of the customer's requirements are neglected, he may soon cease to use a vending machine. It is difficult and slow to regain lost business.

MANAGEMENT ATTITUDES

The attitudes of those who own or control the actual or potential sites for milk vending machines are often favorable to the installation of such units. Objections appear to be less formidable than in earlier years. Experience with milk vending machines and the promotion which interested groups give to this form of merchandising may lessen objections.

According to a study by Cornell University at industrial plants (19) half of the persons interviewed believed that there was no need for milk vending machines, mainly because of the few people employed. Interviews at about 15 percent of the plants in the upstate New York areas reported unfavorable past experiences, such as poor servicing and sanitation problems. In New York City about a third of the plant operators were not interested in installing milk machines because they were opposed to vending machines in general. Many of these people stated that vending machines interfere with an employee's work. This was especially true in plants using piece-work employees. Plant owners were interested in keeping factory machines operating with no rest breaks for employees. In a few instances, management expressed a reluctance to become involved with vending operators. Following are comments from interviews at 222 industrial plants which were not using milk vending machines. All of these plants were in New York State.

COMMENTS	UPSTATE NEW YORK	NEW YORK CITY
	%	%
No need, plant too small	50	49
No objection	35	17
Poor service or experience	15	--
Disapprove of vending machines	--	30
No space	--	4
Total	100	100

There appeared to be greater resistance in New York City to the installation of any type vending machine than in upstate New York cities. Resistance related to poor service might be overcome with improved service schedules and perhaps with the improved machines now appearing on the market.

Even with diminishing opposition to milk vending machines, it is not always easy to obtain permission to install machines. In many cases securing a site is a challenging problem in human relations.

Worries of management, as indicated in the Farmer Cooperative Service Report (28), are that vending:

1. Will reduce operating efficiency of their principal businesses.

2. Will cause confusion and disruption of work by enticing workers away from places where they are critically needed.

3. Might cause unsightly and unsanitary conditions.

4. Might not provide satisfactory service.

Another objection is that it would be necessary to admit vending personnel to work areas.

There were other, less common objections cited in other studies. Lack of interest in vending on the part of employees was noted several times. The following objections by management were noted in a 1955 report (23) of the Washington State Department of Agriculture:

1. There is a close relationship between coin-operated merchandising machines and coin-operated gambling devices.

2. Space should not be spared for vending machines, problems would be created by "litter bugs," and vending equipment would take away from the dignity of the surroundings.

3. Vending equipment might incite an attitude of slovenliness among the employees.

4. "People just would not get their money's worth" from vending machines.

There are several ways to persuade a location owner to permit the installation of a vending machine. One is to convince him that his business will benefit. Another is to convince the employees that they would benefit and therefore should help persuade the location owner to grant permission. The exact approach and specific reasons used are influenced by local conditions. However, answering the typical objections noted above will help secure eventual approval for installing machines, especially in industrial plants.

VENDING OPERATOR ATTITUDES

According to the Farmer Cooperative Service report (28), vending operators were, for the most part, optimistic about future developments. Nine out of ten of the 180 operators responding expressed confidence that vending would continue to grow in their market areas.

Some dairies have refrained from entering vending because they have feared that doing so would jeopardize their present wholesale accounts. Wholesale accounts are especially vulnerable when outdoor machines vend quarts and half-gallons in competition with stores.

Specialized operators have been the most reluctant to adopt milk vending, especially those who vend other beverages. Milk vending was not attractive to them because of such problems as constant refrigeration,

freshness, and lower margins. However, because of more experience, better machines, and greater consumer acceptance, specialized operators are showing more interest in milk vending.

ATTITUDE OF SCHOOL OFFICIALS

In general, school officials have had a negative attitude toward milk vending machines. According to the Cornell report (19), most schools in New York State do not permit the use of milk vending machines. This opposition exists in many states where information is available.

Typical objections to milk vending by school principals in Alabama taken from a 1955 report of the Agricultural Marketing Service, U. S. Department of Agriculture, are:

1. Use of milk vending machines would open the way to other vending machines selling candy and soft drinks.

2. Suitable space not available and corridors would be "cluttered up" with commercial gadgets.

Also noted in a 1955 report of the Rhode Island State Department of Education, was the statement that ". . . milk breaks must have the wholehearted cooperation of the school administration, for without this cooperation very little can be done to increase the availability and consumption of milk in the schools."

ATTITUDE OF LABOR UNIONS

The attitude of labor unions usually has been favorable. Opposition by delivery-truck operators has been limited. The attitude of industrial labor unions has been favorable. They have considered milk vending in a factory to be a benefit for the workers. A contract between a labor union and a West Virginia firm included the following statement:

". . . to be put in the plant are vending machines for milk, coffee, soft drinks and candies. The net profit from the operation of vending machines will be distributed one-half to the two hospitals. . . . one-fourth to the community fund, and one-fourth to the (public park). . ."

Apparently, the union was enough interested in vending to request it, even though there was no direct benefit to the union treasury.

Union labor making home deliveries might object to installations of milk vending machines in or near apartment buildings or in areas where there is a concentration of customers. Installing machines in apartment locations is usually more advisable for a vending operator who has no milk customers in the area.

Effect on Total Milk Sales

Sales of fluid milk through coin-operated vending machines averaged 1.5 percent of total milk sales in the Berkeley County, West Virginia,

market area during the period from October 1955 to June 1957 (6). Total milk sales, population, and personal incomes showed a slight upward trend during this period. Half-gallon containers also were introduced into the market at prices one-half cent per quart lower than for single quarts. Therefore, it is not possible to attribute the total increase in milk sales to the introduction of vending into this area. However, more than 70 percent of the milk vended was sold through machines in plants and offices. Since the percentage of employees drinking milk at work after the installation of vending machines increased more than two-fold, it may be assumed that about two-thirds of the milk vended in plants and offices represented a net gain.

Total sales in five schools representing 30 percent of the school enrollment in the market area increased 26 percent after the introduction of vending, whereas school attendance increased only 7 percent (6). Certainly the volume of sales at schools was influenced by the reduced prices under the Special Milk Program. However, the same prices had prevailed under this program at these schools before the introduction of vending.

More than half of the milk sold through the vending machines in all locations in this West Virginia market area appears to have been a net increase in total sales (6).

A study of milk vending in Missouri for the year 1954 (1) showed that milk sold through vending machines amounted to 1.6 percent of total milk sales.

According to the Farmer Cooperative Service report (28), of the 85 milk distributors expressing an opinion, 83 percent said that milk vending sales represented almost entirely new volume, and 17 percent said these sales were partly additional and partly displacement of conventional sales.

The comparative importance of vended milk is indicated by Johnson, who states that, in 1954, the sales of 350 indoor machines and 26 outdoor machines accounted for about one-half of one percent of the total milk sales in the State of Connecticut (13). The bulletin (20) from the University of Maine indicates that a vending machine probably will increase total milk sales.

Potentials of Milk Vending

The Clemson study (3) estimates that between 100,000 and 125,000 machines might be placed in profitable locations in the United States. The average daily sale per machine in South Carolina was 64 half-pints, and in Wisconsin 100 half-pints daily (8). If 64 daily units per machine, and if 100,000 machines are used as bases for calculation, the country's total potential sales through this outlet would be 1,997 million

half-pints annually (3). If the higher figures of 100 units daily and 125,000 machines are used, the potential volume is 3,900 million half-pints of milk yearly. Conservative estimates indicate that most of the sales through machines represent a net increase (3). If the net increase were only 75 percent of the estimated potential, the new business (assuming a half-pint price of 10 cents per carton) would range from $150,000,000 to $293,000,000 annually (3).

Every additional 10,000 machines would increase yearly sales by 80 to 157 million pounds of milk. Every unit increase in average daily sales per machine would increase additional yearly sales by 13 to 16 million pounds if from 100,000 to 125,000 machines were in use (3).

The potential for milk vending is difficult to appraise. Each machine on a vending route becomes a special market where customer demands differ. In a factory where manual labor is performed customers might find the half-pint container too small, whereas in an office building the clerical workers might prefer a half-pint.

The benefits of milk vending have been recognized by specialized vending operators and milk dealers. Specialized operators are in a position to establish operations in large population centers where installations can be grouped close together. Milk dealers are in a position to establish a few venders on many milk routes. Hence, the milk dealers may be the only means of reaching the smaller urban markets.

As indicated earlier, milk vending machines can compete successfully against soft drink vending machines, especially when chocolate milk is vended.

Sykes (29) does not expect that milk vending will seriously affect existing methods of milk distribution. Probably vending machines will be used primarily to supply milk to suitable vending locations thus creating more retail outlets.

A milk dealer can build a profitable side line by operating milk vending machines in such locations as schools, summer camps, beaches, recreation fields, service stations on main routes, and motels, provided he has enough machines. In some states industrial locations may represent an important potential for milk dealers. The specialized operator probably will find the greatest potential for milk vending in industrial plant locations.

Existing problems must be solved before the maximum potential for milk vending can be realized. Selecting a properly designed machine, coping with lay-offs and shut-downs where machines are in factories, and handling deliveries to machines with differing patterns of sales are a few of the problems to be faced by an operator who plans to engage in this method of merchandising milk.

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